CURRENT STATUS OF THE CLAIMS

In the Claims

The following is a marked-up version of the claims with the language that is underlined ("___") being added and the language that contains strikethrough ("—") being deleted:

1. (CURRENTLY AMENDED) A structure, comprising:

a first structure ~~disposed~~ embedded within pores of a second structure, ~~wherein the first structure is nonporous, wherein the first structure has a diameter from about 1 to 20 nanometers,~~

wherein the first structure includes a nanospecies having a first characteristic and a second detectable characteristic, wherein a second detectable energy is produced corresponding to the second detectable characteristic upon exposure to a first energy; and

wherein the second structure includes a porous material having the first characteristic and a plurality of pores, wherein the first characteristic of the nanospecies and the first characteristic of the porous material are the same, where the interaction of the first characteristic of the nanospecies with the first characteristic of the porous material cause the nanospecies to interact with the porous material and become ~~disposed~~ embedded within ~~in~~ the pores of the porous material, wherein the nanospecies remain embedded within the pores without the addition of a sealant, and wherein the first characteristic is selected from a hydrophobic characteristic, a hydrophilic characteristic, an electrostatic characteristic, and combinations thereof, and a probe, bonded to the porous material, and a fluorophore and a quenching moiety bonded to the probe.

2. (PREVIOUSLY PRESENTED) The structure of claim 1, wherein the nanospecies is selected from a semiconductor quantum dot, a metal nanoparticle, and a magnetic nanoparticle.

3. (CURRENTLY AMENDED) The structure of claim 2, wherein the metal nanoparticle is selected from at least ~~on~~ one of the following: gold nanoparticles, platinum nanoparticles, silver nanoparticles, and copper nanoparticles.

4-5. (CANCELED)

6. (PREVIOUSLY PRESENTED) The structure of claim 1, wherein the porous material is made of a material selected from a metal, a silica material, ceramic, zeolite, and combinations thereof.

7. (ORIGINAL) The structure of claim 1, wherein the porous material is silica having a hydrocarbon-derivatized surface.

8. (CANCELED)

9. (CURRENTLY AMENDED) The structure of claim 1, wherein the second detectable characteristic is selected from at least ~~on~~ one of the following: a fluorescent characteristic, a magnetic characteristic, a luminescent characteristic, a light scattering characteristic, and a surface plasmonic characteristic.

10. (ORIGINAL) The structure of claim 1, wherein the nanospecies is coated with a chemical compound, wherein the nanospecies has the first characteristic after being coated with the chemical compound.

11. (PREVIOUSLY PRESENTED) The structure of claim 10, wherein the nanospecies is a hydrophobic coated semiconductor quantum dot, wherein the coating includes a hydrophobic compound coated on the semiconductor quantum dot.

12. (PREVIOUSLY PRESENTED) The structure of claim 11, wherein the hydrophobic compound is selected from at least one of the following: a $O=PR_3$ compound, an $O=PHR_2$ compound, an $O=PHR_1$ compound, a H_2NR compound, a HNR_2 compound, a NR_3 compound, a HSR compound, a SR_2 compound, and combinations thereof, wherein R is selected from C_1 to C_{18} hydrocarbons, and combinations thereof.

13. (ORIGINAL) The structure of claim 12, wherein R is a saturated linear C_4 to C_{18} hydrocarbon.

14. (PREVIOUSLY PRESENTED) The structure of claim 11, wherein the hydrophobic compound is selected from at least one of the following: an $O=PR_3$ compound, a HNR_2 compound, a HSR compound, a SR_2 compound, and combinations thereof.

15. (PREVIOUSLY PRESENTED) The structure of claim 11, wherein the hydrophobic compound is selected from at least one of the following: tri-n-octylphosphine, stearic acid, and octyldecyl amine.

16. (ORIGINAL) The structure of claim 11, wherein the hydrophobic compound includes tri-n-octylphosphine.

17. (ORIGINAL) The structure of claim 11, wherein the hydrophobic compound includes stearic acid.

18. (ORIGINAL) The structure of claim 11, wherein the hydrophobic compound includes octyldecyl amine.

19. (ORIGINAL) The structure of claim 11, wherein the quantum dot comprises a core and a cap.

20. (ORIGINAL) The structure of claim 11, wherein the core of the quantum dot is selected from the group consisting of IIB-VIB semiconductors, IIIB-VB semiconductors, and IVB-IVB semiconductors.

21. (ORIGINAL) The structure of claim 20, wherein the core of the quantum dot is selected from the group consisting of IIB-VIB semiconductors.

22. (ORIGINAL) The structure of claim 20, wherein the core of the quantum dot is CdS or CdSe.

23. (ORIGINAL) The structure of claim 20, wherein the cap is selected from the group consisting of IIB-VIB semiconductors of high band gap.

24. (ORIGINAL) The structure of claim 20, wherein the cap is selected from ZnS and CdS.

25. (CURRENTLY AMENDED) The structure of claim 1, ~~further comprising a~~ wherein the probe is bonded directly to the porous material.

26. (CURRENTLY AMENDED) The structure of claim 1, ~~further comprising a~~ wherein the probe is bonded indirectly to the porous material via a linking compound, wherein the linking compound is bonded directly to the porous material.

27-59. (CANCELED)

60. (CURRENTLY AMENDED) The structure of claim ~~59~~ 111, wherein the silica material is selected from at least one of the following: a mesoporous material, a macroporous material, and a hybrid mesoporous/macroporous material.

61. (CANCELED)

62. (CURRENTLY AMENDED) The structure of claim ~~61~~ 111, wherein R is a saturated linear C_4 to C_{18} hydrocarbon.

63. (CURRENTLY AMENDED) The structure of claim ~~59~~ 111, wherein the hydrophobic compound is selected from at least one of the following: an $O=PR_3$ compound, a HNR_2 compound, a HSR compound, a SR_2 compound, and combinations thereof.

64. (CURRENTLY AMENDED) The structure of claim ~~59~~ 111, wherein the hydrophobic compound is selected from at least one of the following: tri-n-octylphosphine, stearic acid, and octyldecyl amine.

65. (CURRENTLY AMENDED) The structure of claim ~~59~~ 111, wherein the hydrophobic compound includes tri-n-octylphosphine.

66. (CURRENTLY AMENDED) The structure of claim ~~59~~ 111, wherein the hydrophobic compound includes stearic acid.

67. (CURRENTLY AMENDED) The structure of claim ~~59~~ 111, wherein the hydrophobic compound includes octyldecyl amine.

68. (CURRENTLY AMENDED) The structure of claim ~~59~~ 111, wherein the semiconductor quantum dot comprises a core and a cap.

69. (CURRENTLY AMENDED) The structure of claim ~~59~~ 111, wherein the core of the semiconductor quantum dot is selected from the group consisting of IIB-VIB semiconductors, IIIB-VB semiconductors, and IVB-IVB semiconductors.

70. (PREVIOUSLY PRESENTED) The structure of claim 69, wherein the core of the semiconductor quantum dot is selected from the group consisting of IIB-VIB semiconductors.

71. (PREVIOUSLY PRESENTED) The structure of claim 69, wherein the core of the semiconductor quantum dot is CdS or CdSe.

72. (PREVIOUSLY PRESENTED) The structure of claim 69, wherein the cap is selected from the group consisting of IIB-VIB semiconductors of high band gap.

73. (PREVIOUSLY PRESENTED) The structure of claim 69, wherein the cap is selected from ZnS and CdS.

74-78. (CANCELED)

79. (CURRENTLY AMENDED) The structure of claim ~~74~~ 114, wherein the porous material is selected from at least one of the following: a mesoporous material, a macroporous material, and a hybrid mesoporous/macroporous material.

80-81. (CANCELED)

82. (CURRENTLY AMENDED) The structure of claim ~~74~~ 117, wherein the nanospecies is coated with a chemical compound, wherein the nanospecies has the first characteristic after being coated with the chemical compound.

83. (CURRENTLY AMENDED) The structure of claim ~~74~~ 117, wherein the nanospecies is a hydrophobic coated semiconductor quantum dot, wherein the coating includes a hydrophobic compound coated on the semiconductor quantum dot.

84. (CANCELED)

85. (CURRENTLY AMENDED) The structure of claim ~~84~~ 114, wherein R is a saturated linear C_4 to C_{18} hydrocarbon.

86. (CURRENTLY AMENDED) The structure of claim ~~83~~ 114, wherein the hydrophobic compound is selected from at least one of the following: an $O=PR_3$ compound, a HNR_2 compound, a HSR compound, a SR_2 compound, and combinations thereof.

87. (CURRENTLY AMENDED) The structure of claim ~~83~~ 114, wherein the hydrophobic compound is selected from at least one of the following: tri-n-octylphosphine, stearic acid, and octyldecyl amine.

88. (CURRENTLY AMENDED) The structure of claim ~~83~~ 114, wherein the hydrophobic compound includes tri-n-octylphosphine.

89. (CURRENTLY AMENDED) The structure of claim ~~83~~ 114, wherein the hydrophobic compound includes stearic acid.

90. (CURRENTLY AMENDED) The structure of claim ~~83~~ 114, wherein the hydrophobic compound includes octyldecyl amine.

91. (CURRENTLY AMENDED) The structure of claim ~~83~~ 114, wherein the semiconductor quantum dot comprises a core and a cap.

92. (CURRENTLY AMENDED) The structure of claim ~~83~~ 114, wherein the core of the semiconductor quantum dot is selected from the group consisting of IIB-VIB semiconductors, IIIB-VB semiconductors, and IVB-IVB semiconductors.

93. (PREVIOUSLY PRESENTED) The structure of claim 92, wherein the core of the semiconductor quantum dot is selected from the group consisting of IIB-VIB semiconductors.

94. (PREVIOUSLY PRESENTED) The structure of claim 92, wherein the core of the semiconductor quantum dot is CdS or CdSe.

95. (PREVIOUSLY PRESENTED) The structure of claim 92, wherein the cap is selected from the group consisting of IIB-VIB semiconductors of high band gap.

96. (PREVIOUSLY PRESENTED) The structure of claim 92, wherein the cap is selected from ZnS and CdS.

97. (PREVIOUSLY PRESENTED) The structure of claim 1, wherein the pores have a diameter from about 10 to about 50 nanometers.

98. (CANCELED)

99. (CURRENTLY AMENDED) The structure of claim ~~59~~ 111, wherein the pores have a diameter from about 10 to about 50 nanometers.

100-103 (CANCELED)

104. (CURRENTLY AMENDED) The structure of claim ~~102~~ 83, wherein the hydrophobic compound is selected from at least one of the following: a $O=PR_3$ compound, an $O=PHR_2$ compound, an $O=PHR_1$ compound, a H_2NR compound, a HNR_2 compound, a NR_3 compound, a HSR compound, a SR_2 compound, and combinations thereof, wherein R is selected from C_1 to C_{18} hydrocarbons, and combinations thereof.

105. (PREVIOUSLY PRESENTED) The structure of claim 104, wherein R is a saturated linear C_4 to C_{18} hydrocarbon.

106. (CURRENTLY AMENDED) The structure of claim ~~102~~ 83, wherein the hydrophobic compound is selected from at least one of the following: an $O=PR_3$ compound, a HNR_2 compound, a HSR compound, a SR_2 compound, and combinations thereof.

107. (CURRENTLY AMENDED) The structure of claim ~~102~~ 83, wherein the hydrophobic compound is selected from tri-n-octylphosphine, stearic acid, and octyldecyl amine.

108. (CURRENTLY AMENDED) The structure of claim ~~102~~ 83, wherein the hydrophobic compound includes tri-n-octylphosphine.

109. (CURRENTLY AMENDED) The structure of claim ~~102~~ 83, wherein the hydrophobic compound includes stearic acid.

110. (CURRENTLY AMENDED) The structure of claim ~~102~~ 83, wherein the hydrophobic compound includes octyldecyl amine.

111. (NEW) A structure, comprising:

a first structure embedded within pores of a second structure,

wherein the first structure includes a nanospecies having a first characteristic and a second detectable characteristic, wherein a second detectable energy is produced corresponding to the second detectable characteristic upon exposure to a first energy, wherein the nanospecies is a hydrophobic coated semiconductor quantum dot, wherein the coating includes a hydrophobic compound coated on the semiconductor quantum dot, wherein the hydrophobic compound is selected from at least one of the following: an $O=PR_3$ compound, an $O=PHR_2$ compound, an $O=PHR_1$ compound, a H_2NR compound, a HNR_2 compound, a NR_3 compound, a HSR compound, a SR_2 compound, and combinations thereof, wherein R is selected from C_1 to C_{18} hydrocarbons, and combinations thereof; and

wherein the second structure includes a porous material having the first characteristic and a plurality of pores, wherein the porous material is silica having a hydrocarbon-derivatized surface, wherein the first characteristic of the nanospecies and the first characteristic of the porous material are the same, where the interaction of the first characteristic of the nanospecies with the first characteristic of the porous material cause the nanospecies to interact with the porous material and become embedded within the pores of the porous material, wherein the nanospecies remain embedded within the pores without the addition of a sealant, and

a probe, bonded to the porous material, and a fluorophore and a quenching moiety bonded to the probe.

112. (NEW) The structure of claim 111, wherein the probe is bonded directly to the porous material.

113. (NEW) The structure of claim 111, wherein the probe is bonded indirectly to the porous material via a linking compound, wherein the linking compound is bonded directly to the porous material.

114. (NEW) A structure, comprising:

a first structure embedded within pores of a second structure,

wherein the first structure includes a nanospecies having a first characteristic and a second detectable characteristic, wherein a second detectable energy is produced corresponding to the second detectable characteristic upon exposure to a first energy, wherein the nanospecies is a hydrophobic coated semiconductor quantum dot, wherein the coating includes a hydrophobic compound coated on the semiconductor quantum dot, wherein the hydrophobic compound is selected from at least one of the following: an $O=PR_3$ compound, an $O=PHR_2$ compound, an $O=PHR_1$ compound, a H_2NR compound, a HNR_2 compound, a NR_3 compound, a HSR compound, a SR_2 compound, and combinations thereof, wherein R is selected from C_1 to C_{18} hydrocarbons, and combinations thereof; and

wherein the second structure includes a porous material having the first characteristic and a plurality of pores, wherein the first characteristic of the nanospecies and the first characteristic of the porous material are the same, where the interaction of the first characteristic of the nanospecies with the first characteristic of the porous material cause the nanospecies to interact with the porous material and become embedded within the pores of the porous material, wherein the nanospecies remain embedded within the pores without the addition of a sealant, and

a probe, bonded to the porous material, and a fluorophore and a quenching moiety bonded to the probe.

115. (NEW) The structure of claim 114, wherein the probe is bonded directly to the porous material.

116. (NEW) The structure of claim 114, wherein the probe is bonded indirectly to the porous material via a linking compound, the linking compound is bonded directly to the porous material.

117. (NEW) A structure, comprising:

a first structure embedded within pores of a second structure,

wherein the first structure includes a nanospecies having a first characteristic and a second detectable characteristic, wherein a second detectable energy is produced corresponding to the second detectable characteristic upon exposure to a first energy; and

wherein the second structure includes a porous material having the first characteristic and a plurality of pores, wherein the porous material is silica having a hydrocarbon-derivatized surface, wherein the first characteristic of the nanospecies and the first characteristic of the porous material are the same, where the interaction of the first characteristic of the nanospecies with the first characteristic of the porous material cause the nanospecies to interact with the porous material and become embedded within the pores of the porous material, wherein the nanospecies remain embedded within the pores without the addition of a sealant, and

a probe, bonded to the porous material, and a fluorophore and a quenching moiety bonded to the probe.

118. (NEW) The structure of claim 117, wherein the probe is bonded directly to the porous material.

119. (NEW) The structure of claim 117, wherein the probe is bonded indirectly to the porous material via a linking compound, the linking compound is bonded directly to the porous material.

120. (NEW) The structure of claim 117, wherein the nanospecies is selected from a semiconductor quantum dot, a metal nanoparticle, and a magnetic nanoparticle.

121. (NEW) The structure of claim 120, wherein the metal nanoparticle is selected from at least one of the following: gold nanoparticles, platinum nanoparticles, silver nanoparticles, and copper nanoparticles.

122. (NEW) The structure of claim 83, wherein R is a saturated linear C_4 to C_{18} hydrocarbon.

123. (NEW) The structure of claim 83, wherein the hydrophobic compound is selected from at least one of the following: an $O{=}PR_3$ compound, a HNR_2 compound, a HSR compound, a SR_2 compound, and combinations thereof.

124. (NEW) The structure of claim 83, wherein the hydrophobic compound is selected from at least one of the following: tri-n-octylphosphine, stearic acid, and octyldecyl amine.

125. (NEW) The structure of claim 83, wherein the hydrophobic compound includes tri-n-octylphosphine.

126. (NEW) The structure of claim 83, wherein the hydrophobic compound includes stearic acid.

127. (NEW) The structure of claim 83, wherein the hydrophobic compound includes octyldecyl amine.

128. (NEW) The structure of claim 83, wherein the semiconductor quantum dot comprises a core and a cap.

129. (NEW) The structure of claim 83, wherein the core of the semiconductor quantum dot is selected from the group consisting of IIB-VIB semiconductors, IIIB-VB semiconductors, and IVB-IVB semiconductors.

130. (NEW) The structure of claim 129, wherein the core of the semiconductor quantum dot is selected from the group consisting of IIB-VIB semiconductors.

131. (NEW) The structure of claim 129, wherein the core of the semiconductor quantum dot is CdS or CdSe.

132. (NEW) The structure of claim 129, wherein the cap is selected from the group consisting of IIB-VIB semiconductors of high band gap.

133. (NEW) The structure of claim 129, wherein the cap is selected from ZnS and CdS.

134. (NEW) The structure of claim 117, wherein the pores have a diameter from about 10 to about 50 nanometers.